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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER	
SAYADIAN, HRAYR	

ART UNIT	PAPER NUMBER
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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
eOAPilot@kmob.com

Office Action Summary	Application No.	Applicant(s)	
	09/785,944	FERMANN, MARTIN E.	
	Examiner	Art Unit	
	Hrayr A. Sayadian	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 December 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33 and 35-50, and 55-66* is/are pending in the application.

4a) Of the above claim(s) *9,12,27-29,47-49 and 58* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,10,11,13-26,30-33,35-46,50,55-57 and 59-66* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 February 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED OFFICE ACTION

Election Requirement

1. This Application was the subject of a Restriction Requirement requiring election of a Species amongst independent inventions, which Requirement was made final in the Office Action dated 09/25/2006. This Restriction Requirement and its Finality are hereby maintained. And claims 9,12,27-29,47-49 and 58 are continued to be withdrawn from further consideration as being drawn to non-elected inventions. See, for example, 37 CFR § 1.142(b).

Objection to the 12/21/2006 Amendment – New Matter

2. The amendment filed on 12/21/2006 is objected to under 35 U.S.C. § 132(a) because it introduces new matter into the disclosure of the invention by way of amending paragraph [0047]. Amended paragraph [0047] introduces new matter because it lacks support in the originally filed disclosure of the invention. Specifically, the originally filed disclosure of the invention discloses neither "V-values higher than 2.5 and relatively high index differences between core and cladding (i.e. a [delta] n > 0.3%) can be effectively employed [for the fiber 13]," nor "the number of modes [in fiber 13] is preferably in the range of 3 to 3000 and more preferably in the range of 3 to 1000."

Although the language objected to as new matter [hereinafter "QLOTANM"] forms part of the U.S. Pat. No. 5,818,630 to Fermann et al. [hereinafter "Fermann I"], the QLOTANM is being introduced into this application (and now claimed) in a context neither disclosed by Fermann I, nor disclosed by this application.

The QLOTANM introduced by the amendment refers to fiber 13 is evidenced by the context of paragraph [0047], which describes fiber 13 (see, for example, the sentence before and the sentence after the quoted language introduced by the amendment; see, also newly added claims 63 and 65, directed to the quoted language introduced by the amendment). Fiber 13 forms part of the oscillator of the laser this application is directed to. On the other hand, the QLOTANM disclosed in Fermann I is directed to a fiber forming part of an amplifier. And as Applicants well recognize and argue (see, for example, the second paragraph of Applicants

response disputing Double Patent Rejection of claim 1 of this application over claim 25 of Fermann I) an amplifier is different than a laser. Absent disclosure in this application that a characteristic of a fiber making part of the laser disclosed by this application is the same as the characteristic of a fiber forming part of an amplifier not disclosed for use with the laser, Applicants' amendment introduced new matter.

35 U.S.C. § 132(a) prohibits any "amendment [from] introduce[ing] new matter into the disclosure of the invention." Accordingly, Applicants are required to cancel, in the reply to this Office Action, the new matter introduced by the amendment to the specification.

Objection to Labeling this Application a "Continuation

3. A continuing-in part (but not continuing) application may disclose or claim, or both, subject matter not in a parent application. See, for example, 37 CFR § 1.53.

Examiner notes that presenting language from Fermann I (wherein Fermann I was incorporated in paragraph [0009] forming part of the Background of The Invention and directed to Background Relating to Optical Amplifiers) as if that language is directed to a fiber forming part of the oscillator of the laser of this application, introduces new matter in the present application. This application therefore cannot be a "Continuation" application of U.S. Patent Application 09/199,728 [hereinafter "Fermann II"]. Examiner notes that this application lacks pendency with Fermann I and therefore this application could be neither a "Continuation" (or Continuation-In-Part) nor "Divisional" of Fermann I and, apparently, Applicants do not claim it to be so.

Moreover, Examiner notes that the claims are also objected to as presenting new matter in light of the disclosure.

To label this application a "Continuation" of Fermann II, Applicants therefore must cancel the material directed to the Fermann II disclosure not in the Background Relating to Optical Amplifiers of this Application's disclosure.

Any claim in the present application not supported by the disclosure or claim(s) of a parent application will have an effective filing date equal to the date introducing the matter objected to (12/21/2006). Any claim in the present application fully supported under 35 U.S.C. §

112 by a parent application will have the effective filing date of the parent application. See, for example, M.P.E.P. § 706.02 V.

Claim Rejections - 35 U.S.C. § 112

4. Claims 63-65 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. These claims contain subject matter not described in the specification as originally filed in such a way as to reasonably convey to one skilled in the relevant art that Applicants, at the time the application was filed, had possession of the claimed invention.

5. Claim 35 depends from claim 34, which no longer exists because it has been cancelled. Scope of claim 35 therefore is indefinite.

Correction is required.

Claim Rejections - 35 U.S.C. § 102

6. Claims 1-4, 7, 16-19, 22-26, 30-41, 46, 50, and 55-57 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 5,627,848 to Fermann et al. [hereinafter Fermann III]. U.S. Pat. No. 4,829,529 to Kafka [hereinafter "Kafka"] is cited to show the scope of the recitation "multi-mode fiber."

With respect to Claims 1, 30, 46:

As to claim interpretation: The recitation "multi-mode optical fiber" includes fibers wherein multi-modes exist. See, for example, paragraph [0047] of the present application. Cladding of fibers also guides modes. See, for example, supra, As such, the recitation "multi-mode optical fibers" is read broadly to include fibers that guide multi-modes, whether through the core or within the cladding. See also Kafka, disclosing a fiber comprising a central core that is single-mode, within a surrounding area that is multi-mode, surrounded by cladding. And see, for example, claims 62 and 64 showing Applicants' intent that the scope of independent claims be broadly read, which would include the multi-mode fiber have a v-value be equal to or smaller than 2.41, and would include the multi-mode optical fiber not be capable of supporting 3 or more propagating

modes. This conclusion is based on the Doctrine of claim interpretation, "[w]here some claims are broad and others narrow, the narrow claim limitations cannot be read into the broad [claim]." See, for example, *Yarway Corp. v. Eur-Control USA, Inc., et al.*, 227 USPQ 352, 356 (Fed. Cir. 1985) (quoting *Kalman v. Kimberly-Clark Corp.*, 218 USPQ 781, 788 (Fed. Cir. 1983), cert. denied, 104 S.Ct. 1284, 224 USPQ 520 (1984)). Additionally, the recitation "an optical guide ... which confines the light to preferentially the fundamental mode of said multi-mode fiber" has a scope including a single mode fiber (which inherently confines light to the fundamental mode) and a mode stripper (which Fermann III discloses as striping away cladding modes).

As to art rejection: Fermann III discloses a double clad multi-mode fiber 101 having a gain medium. Fiber 101 is coupled to an optical guide (either of single-mode fiber 201, or mode stripper 104), which confines the light to preferentially the fundamental mode of the multi-mode fiber.

See the Abstract in Fermann III disclosing the generation of 560 femto-second (sub-pico-second) pulses.

And Fermann III discloses the fiber 101 including a core with a gain medium concentrated centrally within the core.

With respect to Claims 2-4:

Fermann III discloses a passive mode-locking element 118 that comprises InGaAsP.

With respect to Claims 7 and 36:

Fermann III discloses a single-mode fiber 201 that inherently acts as a mode filter because it guides a single mode.

With respect to Claim 16:

Fermann III discloses a polarization beam splitter 117 for output coupling pulses from the laser.

With respect to Claim 17:

Fermann III discloses a pair of reflectors (any of (105, 107), (202, 107), (202, 303), (601, 107), and (107, 701)).

With respect to Claim 18:

Fermann III discloses one of the pair of reflectors being partially reflecting (for example, 107 of the pair (107, 701).

With respect to Claim 19:

Fermann III discloses a mode-locking mechanism 118 on mirror 107.

With respect to Claims 22-24:

Fermann III discloses a linear phase drift compensator comprising Faraday rotators 113 and 114.

With respect to Claim 25, 26:

Fermann III discloses a linear phase drift compensator comprising a wave plate (for example, 114, or 116).

With respect to Claim 31-33:

Fermann III discloses an environmental stabilizer (using birefringent fiber along with the Faraday rotators).

With respect to Claim 35:

Fermann III discloses the optical guide comprising an optical fiber doped with an amplifying medium (the mode stripper 104). The mode stripper 104 includes a gain/amplifying medium concentrated centrally. With respect to claim 35, the recitation "fraction of the core" has a scope broad enough to read on the single mode fiber of the stripper 104 (which single mode fiber is concentrated centrally within a fraction of the core of the cladding core forming the stripper 104. Additionally, it is also noted that the recitation "fraction" has a scope including the "whole."

With respect to Claims 37-39:

Fermann III discloses the mode stripper 104, which acts as a mode-filter because it strips away the cladding modes. The mode stripper has the gain medium of fiber 101, which excites the fundamental mode. The recitation of "an efficiency of at least 90%" is always true because it lacks a comparison for the efficiency number to have a limited scope; accordingly, its scope includes the efficiency being compared with the gain medium exciting the fundamental mode, which is 100% of its function.

With respect to Claims 40 and 41:

Fermann III discloses a single mode fiber 201 that has a positive dispersion.

With respect to Claim 50:

Fermann III discloses a grating 701 written on fiber 101, the grating reflecting primarily the fundamental mode because the invention of Fermann III produces primarily the fundamental mode of the fiber 101.

With respect to Claims 55, 59, 60, 61, and 66:

Fermann III additionally discloses fiber 101 to be coiled (bent).

With respect to Claims 56 and 57:

See above the rejection of claims 2 and 7, respectively.

With respect to claims 62-65:

Fermann III discloses the features recited in claims 62-65.

For example, the v-value of the fiber disclosed in Fermann III (having a diameter of 6 microns and 0.0588 for n1^2 –n2^2, and lambda of 1.5 microns) would be about 3, which is "greater than about 2.5" (using equation 5-7 in "Fiber Optic Communications," by Palais, hereinafter "Palais"). Accordingly, the fiber disclosed in Fermann III would at least propagate three core modes and additionally would also propagate cladding modes.

7. Claims 1, 7, 8, 17, 18, 34-39, 46, 50, and 62-65 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 5,422,897 to Wyatt et al. [hereinafter "Wyatt"]. Federal Standard FS-1037C (Telecommunications: Glossary of Telecommunication Terms) is presented to show definition of some terms in the technological arts.

With respect to Claims 1 and 46:

As to claim interpretation: Cladding is broadly read to include a region having index of refraction that is lower than what it surrounds. See, for example FS-1037C defining "cladding." And Wyatt discloses such regions. See, for example, the regions around the central portions of fibers 1 and 2; these regions would have lower higher indexes of refraction lest guiding/confining of light fails.

As to art rejection: Wyatt discloses a multi-mode fiber 1 having a cladding and doped with a gain medium; a pump 3 coupled to the cladding and exciting the gain medium; an optical guide 2 confining light preferentially to the fundamental mode of the multi-mode fiber 1.

Wyatt also discloses the fiber 1 including a core with the gain medium concentrated centrally within the core.

Wyatt discloses the coupling efficiency from the pump 3 to the multi-mode fiber in practical terms being about 50%. See, for example, column 6, lines 6-9. Surely, and a portion of what is not coupled into the multi-mode fiber would be coupled into the cladding around the multi-mode fiber. As "a pump ... for exciting said gain medium," examiner notes that the "for exciting ..." is intended use language not necessarily narrowing the limitation pump. Additionally, whether pump 3 couples into the multi-mode-fiber directly or indirectly (by way of the pump portion coupled into the cladding and then coupled into the multi-mode fiber), the pump 3 Wyatt discloses excites the gain medium.

With respect to Claims 7, 8, and 36:

Wyatt discloses a single-mode fiber 2 that inherently acts as a mode filter because it guides a single mode. And the single-mode fiber 2 is fusion spliced to the multi-mode fiber 1.

With respect to Claim 17:

Wyatt discloses a pair of reflectors (g1, g2).

With respect to Claim 18:

Wyatt discloses one of the pair of reflectors (g2).

With respect to Claims 34 and 35:

Wyatt discloses the optical guide comprising an optical fiber doped with an amplifying medium (the mode stripper 104). The mode stripper 104 includes a gain/amplifying medium concentrated centrally. With respect to claim 35, the recitation "fraction of the core" (attendant with the 112 rejection above) has a scope broad enough to read on the single mode (SM) fiber 2 and the multi-mode (MM) fiber 1; in either case, the gain medium in Wyatt is concentrated centrally within a fraction of the core of the cladding. Additionally, it is also noted that the recitation "fraction" has a scope including the "whole."

With respect to Claims 37-39:

Wyatt discloses the SM fiber 2 acting as a mode-filter because it is a single mode fiber guiding the fundamental mode of the M fiber 1. And the SM fiber 2 has a gain medium, which excites the fundamental mode of the MM fiber 1. The recitation of "an efficiency of at least 90%" is always true because it lacks a comparison for the efficiency number to have a limited scope; accordingly, its scope includes the efficiency being compared with the gain medium exciting the fundamental mode, which is 100% of its function.

With respect to Claim 50:

Wyatt discloses a grating g1 written on the MM fiber 1, which grating g1 reflects primarily the fundamental mode of MM fiber 1.

With respect to claims 62-65:

Fermann III discloses the features recited in claims 62-65.

For example, the fiber core is disclosed as multi-mode. And according to Applicants own admission, a multi-mode core has a v-value of greater than about 2.5. Moreover according to FIG. 5-17, a multi-mode cored fiber propagates at least three modes, these including the fundamental mode and the nearly overlapping TM and TE and HE modes).

Claim Rejections - 35 U.S.C. § 103

8. Claims 5, 6, 20, and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann III.

With respect to claims 5 and 6:

Fermann III discloses using InGaAsP as the mode-locker. It is well known to use InP substrate with InGaAsP layers to avoid lattice mismatch problems. And InP is subject to two-photon absorption, which absorption inherently reduces (therefore limiting) the light intensity.

To avoid lattice mismatch problems therefore it would have been obvious to use InP as the substrate supporting InGaAsP passive mode-locker.

9. Claims 8-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann III in view of U.S. Pat. No. 5,074,633 to Cohen et al. [hereinafter "Cohen"].

Cohen discloses fusion splicing and tapering different fibers, which tapered splicing results in taper regions substantially free of constrictions and a splice having relatively low optical losses. See, for example, the Abstract and the figure as shown on the front page of Cohen. Because of continuity at the splice, tapering will occur in both fibers.

To obtain taper regions substantially free of constrictions and a splice having relatively low optical losses therefore it would have been obvious to fusion splice the multi-mode and single mode fibers.

10. Claims 13-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann III in view of "V-Groove Side Pumped 1.5 micron Fiber Amplifier," by Goldberg et al., CLEO 1996 [hereinafter "Goldberg"].

Goldberg discloses v-groove side pumping to keep the fiber ends unobstructed and be able to use multiple pumping sites (thus increase the pumping power. See, for example, the second paragraph of Goldberg describing the method's advantages. Additionally it is noted that the coupling is optical.

To keep the fiber ends unobstructed and increase the pumping power therefore it would have been obvious to use v-groove side pumping.

11. Claim 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann III in view of either U.S. Pat. No. 5,696,782 to Harter et al. [hereinafter "Harter I"] or "All-Fiber Femto-second Pulse ...," Appl. Phys. Letter 66, (1995), pp-1053-1055, by Galvanauskas et al. [hereinafter "Galvanauskas I"].

It is well known that single mode fibers are sensitive to peak powers. It is also well known to use output couplers (the scope of recitation "output coupler" is treated broadly to include elements before and after the output coupler) limiting the power in single mode fibers to protect them. See, for example either of Harter I (FIG. 4) or

Galvanauskas I. To protect the single mode fiber therefore it would have been obvious to use an output coupler to reduce the peak power.

Additionally, since reducing the power is art recognized result-effecting variables/parameters, as per established patent law precedent (see, for example M.P.E.P. § 2144.05) therefore it would have been obvious to optimize (for example by routine experimentation) the peak power in the single mode fiber to be less than 10% of the peak power in the cavity to protect the single mode fiber.

12. Claims 43-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fermann III in view of either Harter I or Galvanauskas I, further in view of U.S. Pat. No. 5,815,307 to Arbore et al. [hereinafter "Arbore"] and "Fiber-laser-based Femtosecond ...," Optics Letter, 22 (1997), pp 105-107, by Galvanauskas et al. [hereinafter "Galvanauskas II"].

Arbore discloses using a LiNbO3 having chirped grating to simultaneously chirp adjust (and thus compress) and frequency double ultra-short pulses. See, for example the front page. Arbore also recognizes the importance of both compressing pulses and controlling their frequency. Both Arbore and Galvanauskas II recognize the benefit of using periodically poled LiNbO3 for harmonic generation because of its large nonlinear coefficient.

To simultaneously chirp adjust (and thus compress) and frequency double pulses using a large non-linear coefficient (and therefore an efficient) material therefore it would have been obvious to modify the combination of Fermann III with Harter I or with Galvanauskas I to use PPLN as a frequency doubler and a pulse compressor.

13. Claims 2-6, 19, 20, 21, and 30 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann III, as motivated by "Saturable Absorber Modelocked ...," by De Souza, et al., Electronics Letters, 29 (1993) pp. 447-449 [hereinafter "De Souza"].

Fermann III discloses modelocking to initiate production of short pulses (see, for example, claim 10). And De Souza discloses using InGaAsP on InP substrate as the passive modelocker because it has both fast and slow recovery mechanism (see, for

example, De Souza, the paragraph below FIG. 3 on page 448). And the result of fast recovery due to InGaAsP is mode-locked pulses shorter than 500 pico-second.

To initiate production of short pulses by a mechanism having short and fast recovery, therefore, it would have been obvious to modify the disclosure of Wyatt by including modelocking by InGaAsP.

14. Claims 16, 22-26, 31-33, 40, and 41 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann III.

With respect to claims 16, 22-26, 31-33:

Fermann III discloses these features to compensate for linear and non-linear phase drifts. See, for example, claims 6, 7, 9, and 12.

To compensate for linear and non-linear phase drifts therefore it would have been obvious to modify the disclosure of Wyatt by the disclosure of Fermann III.

With respect to claims 40 and 41:

Fermann III discloses using a length of a single mode fiber having positive dispersion to compensate for the negative dispersion that might exist. To compensate for negative dispersion therefore it would have been obvious to modify the disclosure of Wyatt by the disclosure of Fermann III.

15. Claims 55, 57, 59-61, and 66 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann III or in view of U.S. Pat. No. 4,832,437 to Kim et al. [hereinafter "Kim"].

Fermann III discloses that bending the fiber 101 minimizes non-linear polarization changes. To minimize non-linear polarization changes therefore it would have been obvious bend the multi-mode fiber.

Alternatively, Kim discloses coiling multi-mode fiber to strip light in higher order modes without striping light in the fundamental mode. See, for example, column 5, lines 39-45. To strip away higher order modes therefore it would have been obvious to coil (which inherently includes bending) the multi-mode fiber.

The single mode fiber disclosed in Wyatt filters the light.

16. Claim 59-61 and 66 is also rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann III.

Fermann III discloses that coiling the fiber onto a 3.5 drum achieves efficient absorption of skew rays from the pump. To achieve efficient absorption of skew rays from the pump beam therefore it would have been obvious make the multi-mode fiber have a coil.

17. Claim 56 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann III or Kim, further in view of Fermann III.

Fermann III discloses modelocking to initiate production of short pulses (see, for example, claim 10).

To initiate production of short pulses therefore it would have been obvious to modify Wyatt, as modified by Fermann III or Kim, by including mode-locking.

18. Claims 9-11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Cohen.

Cohen discloses fusion splicing and tapering different fibers, which tapered splicing results in taper regions substantially free of constrictions and a splice having relatively low optical losses. See, for example, the Abstract and the figure as shown on the front page of Cohen. Because of continuity at the splice, tapering will occur in both fibers.

To obtain taper regions substantially free of constrictions and a splice having relatively low optical losses therefore it would have been obvious to fusion splice the multi-mode and single mode fibers.

19. Claims 13-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Goldberg.

Goldberg discloses v-groove side pumping to keep the fiber ends unobstructed and be able to use multiple pumping sites (thus increase the pumping power. See, for

example, the second paragraph of Goldberg describing the method's advantages. Additionally it is noted that the coupling is optical.

To keep the fiber ends unobstructed and increase the pumping power therefore it would have been obvious to use v-groove side pumping.

20. Claim 42 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of view of Fermann III, further in view of Harter I or Galvanauskas I.

It is well known that single mode fibers are sensitive to peak powers. It is also well known to use output couplers (the scope of recitation "output coupler" is treated broadly to include elements before and after the output coupler) limiting the power in single mode fibers to protect them. See, for example either of Harter I (FIG. 4) or Galvanauskas I. To protect the single mode fiber therefore it would have been obvious to use an output coupler to reduce the peak power.

Additionally, since reducing the power is art recognized result-effecting variables/parameters, as per established patent law precedent (see, for example M.P.E.P. § 2144.05) therefore it would have been obvious to optimize (for example by routine experimentation) the peak power in the single mode fiber to be less than 10% of the peak power in the cavity to protect the single mode fiber by reducing the peak power.

21. Claims 43-45 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wyatt in view of Fermann III further in view of either Harter I or Galvanauskas I, further in view of Arbore and Galvanauskas II.

Arbore discloses using a LiNbO3 having chirped grating to simultaneously chirp adjust (and thus compress) and frequency double ultra-short pulses. See, for example the front page. Arbore also recognizes the importance of both compressing pulses and controlling their frequency. Both Arbore and Galvanauskas II recognize the benefit of using periodically poled LiNbO3 for harmonic generation because of its large nonlinear coefficient.

To simultaneously chirp adjust (and thus compress) and frequency double pulses using a large non-linear coefficient (and therefore an efficient) material therefore it would

have been obvious to modify the combination of Wyatt with Fermann III with Harter I, or with Galvanauskas I, to use PPLN as a frequency doubler and a pulse compressor.

Double Patenting

22. Claim 65 is rejected under 35 U.S.C. § 101 as claiming the same invention as that of claim 64 of this application.

This is a statutory double patenting rejection.

23. Claims 1-8, 10, 11, 13-26, 30-46, 5, 55-57, and 59-66 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of Fermann I. Although the conflicting claims are not identical, they are not patentably distinct from each other.

For example, Claim 25 of Fermann I anticipates claim 1 of the present application. And claim 25 modified (and motivated) by the prior art applied above (under the 102 and 103 rejections), if necessary, renders obvious the remaining claims.

A pump is recited, and the pump would couple to the cladding. And the amplifying system of claim 25 has a cavity repeatedly passing light energy along a cavity axis.

24. Claims 1-8, 10, 11, 13-26, 30-46, 5, 55-57, and 59-66 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4 of U.S. Pat. No. 6,275,512 to Fermann [hereinafter "Fermann IV"].

For example, claim 1 of Fermann IV modified (and motivated) by Fermann I to include a mode filter would render obvious claim 55 of the present application. The other claims of the present application are also rendered obvious in view of claims 1-4 of Fermann IV further in view of the prior art applied above (under the 102 and 103 rejections).

Examiner notes that repeatedly passing signal light through said gain medium has a scope reading on CW operation.

Response to Applicants' Arguments

25. Applicant's prior arguments have been considered, but they are found non-persuasive.

Applicants argue that Fermann III discloses a single mode fiber, whereas the claims recite multi-mode fiber.

Examiner notes that there is no recitation addressing core size or characteristic at least in independent claims 1 and 55. And Examiner notes that the prior art well recognizes the existence of cladding modes in oscillator and the need to strongly attenuate them. And therefore the reasonableness of interpreting multi-mode as including such modes. See, for example, Fermann III, column 4, lines 56-66. See, also Kafka, cited above in the 102 rejection.

Examiner moreover notes that the claims do not reflect the narrow scope Applicants argue for. Indeed, new claims (in addition to them introducing new matter) clearly show that the scope of "multi-mode" as recited in the claims is not necessarily limited to the core being multi-mode, as opposed to the whole fiber being multi-mode. See, for example, at least claim 62, limiting independent claim 1 by reciting the v-value being greater than about 2.41. Under the Doctrine of Claim Differentiation therefore claim 1 must have a scope broader than the further limited claim 62.

Applicants also argue that Wyatt fails to anticipate because it fails to disclose pump coupled to cladding for exciting the gain medium.

Examiner notes that Wyatt explicitly discloses that coupling efficiency to the core is 50%, which entails 50% not coupling to the core. This disclosure includes disclosing a portion of the 50% not coupling to the core coupling to the cladding surrounding the core.

Admitting that Cohen discloses single mode fiber fusion splicing to another single mode fiber, Applicants argue that Cohen fails to remedy the deficiency because it fails to disclose fusion splicing multi-mode fiber to single-mode fiber.

Examiner notes that the Cohen discloses and motivates fusion-splicing fibers having different (significantly different) core diameters. And Cohen's disclosure and motivation would carry over to the broadly recited claims (in this application) wherein the multimode nature of modes is not limited to the core.

Applicants also argue that Goldberg fails to disclose v-groove side pumping a multi-mode fiber.

Again, Examiner notes that that the claims are not limited to the fiber core being single mode. And that Goldberg discloses and motivates v-groove side pumping the fiber, which

includes a cladding and a core (the cladding and the core well recognized in the as supporting multi-modes).

Recognizing that DeSouza discloses mode-locking single-mode fibers, Applicants argue that it does not disclose mode-locking multi-mode fibers. As part of their argument, and citing paragraph [0031] of this application, Applicants stress that mode-locking of a multi-mode fiber was considered "impossible."

In response, Examiner first notes that Applicants disclose in paragraph [0031] that "stable" mode-locking was not demonstrated. This disclosure includes the tacit admission that unstable mode-locking was demonstrated. Moreover, Examiner also notes that the claims are not limited to "stable" versus unstable mode-locking.

As to DeSouza, Examiner notes that the claims of this application are not limited to the fiber core being multi-mode as opposed to the whole fiber supporting plural modes.

Applicants also argue that Wyatt teaches away from bending.

In response Examiner notes that Wyatt discloses bending of fibers having length greater than 1 m as being undesirable. First, Examiner notes that Applicants argue that Hyatt discloses the undesirability (as opposed to the impossibility). Second, Examiner notes that Wyatt expressly discloses that the fundamental mode propagates for distances up to one meter, if the fiber is nominally straight, without significant coupling of power into the higher order modes. This is not teaching away.

Moreover, Examiner notes that Wyatt explicitly discloses that using Yb allows for higher gain at shorter length and therefore avoid issues related to length.

Recognizing that Kim discloses stripping the second order mode without affecting the first order mode, Applicants argue that Kim does not disclose placing a fiber in a cavity. In response, Examiner notes that Kim is introduced as disclosing and motivating stripping of higher modes. And as Applicants recognize, it does disclose and motivate this feature.

And recognizing that Kim discloses stripping the second order mode without affecting the first order mode, Applicants argue that it fails to disclose stripping higher than second order modes.

First, Examiner notes that Applicants are not arguing a feature recited in a claim. Second, Examiner notes that Applicants are arguing reasonable expectation of success.

In response, Examiner notes that there would be a reasonable expectation of success that modes having order higher than the second order would be stripped if the second order mode were stripped.

CONCLUSION

26. Applicants' OR Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, **THIS OFFICE ACTION IS MADE FINAL.** See M.P.E.P. § 706.07(a).

A shortened statutory period for reply to this Office Action is set to expire **THREE MONTHS** from the mailing date of this Office Action. Applicants are reminded of the extension of time policy as set forth in 37 CFR § 1.136(a).

In the event a first reply is filed within TWO MONTHS of the mailing date of this Office Action and the advisory Office Action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory Office Action is mailed, and any extension fee pursuant to 37 CFR § 1.136(a) will be calculated from the mailing date of the advisory Office Action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this Office Action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hrayr A. Sayadian whose telephone number is (571) 272-7779. Examiner Sayadian can normally be reached Monday through Friday, 7:30 am – 4:00 pm.

If attempts to reach Examiner Sayadian by telephone are unsuccessful, his supervisor, Minsun O. Harvey can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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